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50 per cent higher than at the all-India level. Agricultural crops and the plantations, which form the main component of the primary sector, are largely produced for the market and are the basic factors responsible for imparting a high level of productivity to this sector.

1.26 Agriculture in the State is characterized by a high value yielding cropping pattern, good physical yields, a high intensity of cropping and superior cultivation techniques. During 1956-57 the intensity of cropping[1] was 119 per cent (all-India—113%). However, if field crops alone are taken into account, the cropping intensity shoots up to 150 per cent. It is the latter percentage which is the more relevant one, since the area covered by the perennial crops is irrelevant from the point of view of double or triple cropping. All these factors combine to make the agricultural sector of Kerala highly productive, the average level of agricultural output per net cultivated acre in Kerala being about Rs. 360 against Rs. 125 for the whole of India.

1.27 Kerala owes the superiority of its cropping pattern to the large number of high value yielding plantation crops grown in the State. Coconuts, the most important among these, occupy about 20 per cent of the gross cropped area and yield Rs. 450 per acre on an average. Other cash crops in the order of their importance in terms of area covered are pepper, rubber, arecanut, tea, cashewnut, cardamom, and coffee. Taken as a whole, they cover approximately 40 per cent of the gross cropped area.

1.28 Apart from the high productivity aspect of the plantation crops, they are of significance to the economy from two other angles. First, these crops provide the raw material for some of the key industries of the State. Coir making, the most important industry of the State, utilizes the outer husks of the coconuts. Similarly, cashewnut industry, the second most important industry of Kerala, also draws its raw material from the agricultural sector. Besides these, Kerala holds almost a complete all-India monopoly in the production of rubber, which is another important industrial raw material. Secondly, plantation crops derive their prominence from the fact that a large number of crops grown in Kerala find a good export market and are, therefore, very good foreign exchange earners.

1.29 One other feature of the Kerala economy which owes its origin to the agricultural sector may also be pointed out. Unlike the rest of India, where barter trade is still prevalent on a significant scale in the rural areas, Kerala economy is highly monetized. The large number of cash crops grown in the State are all brought to the market for sale. Secondly, since a high percentage of food requirements are obtained from the other parts of India, they are again channelled through the market. A high degree of commercialization of Kerala economy is one of the factors responsible for absorption of a large section of the population in the tertiary sector.

1.30 Otherwise agriculture in Kerala carries with it all the disquieting features common to Indian agriculture. The pressure of population on land is even severer here. The average size of holdings in Kerala has dwindled down to 1.5 acres

[1] Intensity of cropping is the ratio between gross cropped area and net sown area. It gives the degree to which a given piece of land is utilized.

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EXTENSION OF CULTIVABLE AREA

Cotton

2.25 Prior to 1956, Kerala was considered unsuitable for the cultivation of cotton. In that year an experiment was made on a pilot scale and the results were so encouraging that the area under Sea Island (long staple) cotton rose from 126 acres in 1956 to about 3,500 acres in 1959-60.

2.26 Sea Island cotton yields superior lint which can be spun into high count expensive yarn. The latter finds a good market within the country and at present has even got to be imported. The extension of area under this crop will help in saving valuable foreign exchange and it would also provide scope for development of such industries as ginning, baling, spinning and cotton seed oil extraction.

2.27 In view of the above factors it is desirable to undertake further extension of area under cotton. A part of this increase can take place at the expense of acreage under tapioca, which is a low yielding crop. About 0.2 to 0.3 million acres out of 0.56 million acres under tapioca can be diverted in this way during the next decade. Efforts should, however, be made to keep the output of tapioca at the existing level by raising its yield which is at a very low level.

2.28 There is also scope for diverting some highland area under single cropped paddy to Sea Island cotton since such a diversion would yield high returns in terms of value. The exact scope for such a diversion can, however, be ascertained only after the proposed land-use survey has been conducted.

2.29 Assuming 0.3 million acres are brought under Sea Island cotton, as suggested above, additional production of long staple cotton may be expected to reach a level of 192,000 bales by 1970-71.

Sugarcane

2.30 Sugarcane is a high value crop, and, therefore, is quite popular with the farmers. But it is one of those crops whose future extension of area is very much dependent upon the growth of sugar manufacturing industry. Its exact scope will, therefore, depend upon the growth of sugar factories.

2.31 The yield per acre of sugarcane in Kerala is very good (Kerala 40,000 lbs. per acre; U.P. and Bihar 25,000 lbs. per acre; all-India 28,000 lbs. per acre) and can be raised to 55,000 lbs. per acre. This factor favours the extension of sugarcane cultivation and the setting up of new sugar mills. At present there are about 25,000 acres under this crop in Thiruvella area, mostly concentrated around the Pampa river sugarcane factory. There is scope for a large increase in sugarcane acreage in the districts of Palghat, Trivandrum and Ernakulam which possess the requisite irrigation facilities. By 1971, the area under sugarcane may be doubled to about 50,000 acres.

Ginger

2.32 Ginger is a very high value yielding crop (Rs. 1,077 per acre). In view of good demand prospects for ginger in both internal and external markets, the production of

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ginger should be stepped up. The proposed phyto-chemical plant at Munnar would also consume large quantities of raw ginger. The area under ginger cultivation can be extended by 20,000 acres and attempts should be made to raise productivity to one ton per acre through better cultivation techniques, seed selection and use of higher dosage of fertilizers. The likely annual increase in output from these measures is expected to be of the order of 33,000 tons in terms of dry ginger.

Oilseeds

2.33 Oilseeds, other than coconut, account for only a very small proportion of the cropped area, but there is scope for raising the yields and extending the area under these crops as a substitute crop in tapioca fields and in young coconut gardens. In addition, castor cultivation may be introduced in the State along field borders which are considerably wide on the banks of rivers and streams and on the borders of gardens and plantations. Assuming that the measures for increased production are reasonably well implemented, the additional production of edible oilseeds by 1971 would be of the order of 20,000 tons annually.

Banana

2.34 Since bananas need frequent irrigation, cultivation of this crop is quite popular in Kerala, especially on the banks of the rivers and near other sources of water. In view of the very high calorific value of bananas as well as good future demand prospects, the production of bananas should be increased. It is not possible to give an exact idea of the extent to which the area under this crop can be increased but there is scope for growing the crop more intensively in compounds attached to residential houses and in areas which receive the benefits of perennial irrigation.

Pineapple

2.35 There is quite a large demand for pineapples from Kerala, as they are good both in size and in quality. Location of a few additional canning units in the State is likely to add further to the demand. Steps should, therefore, be taken to increase pineapple production. There is scope for fresh plantings in the hilly slopes of Malabar, which at present contain only wild growth.

Lemon Grass

2.36 Lemon grass owes its importance to lemon grass oil which is extracted from the grass. Kerala produces over 88 per cent of the world output of lemon grass oil, most of which is exported. It is a good foreign exchange earner. The output of lemon grass oil has been increasing year after year in spite of unsteady and fluctuating market conditions. From a mere nine tons in 1920, the output rose to 1,400 tons in 1957.

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*433 249 2.37 The lemon grass oil industry in Kerala has good scope for expansion provided the prices are kept competitive. However, since the Second World War some of the Latin American countries have started cultivation of lemon grass on a commercial scale and extraction of oil with efficient methods of distillation. Compared to these countries both the yield of grass as well as its oil content are low in Kerala. Internal demand is also likely to increase considerably in view of the new synthetic chemical industries that are going to be set up within India in the near future. It is, therefore, suggested that the present level of output of lemon grass oil may be raised through measures such as manurial trials, evolution of high yielding and quick maturing strains, control of pests and diseases, designing of efficient stills of small capacity to suit the needs of small growers, etc.

MEASURES FOR INCREASING PRODUCTIVITY

*433 2.38 Replacement of some of the low value crops by high value ones, as indicated above, should be taken up side by side with raising the yield rate of different crops. There is good scope for increasing the yields which can be achieved through (*i*) greater coverage by improved seeds, (*ii*) larger application of manures and fertilizers, (*iii*) increase in irrigation facilities, and (*iv*) improved agricultural practices. These measures are discussed separately in the succeeding pages.

Improved Seeds

*433 242 2.39 Improved seeds are found to increase the yields by 10 to 15 per cent, on an average, while in case of certain crops like sugarcane, hill paddy, groundnut, etc., the output may even go up by 25 per cent. The area covered by improved seeds is very low in Kerala except in the case of paddy and sugarcane, where it is as high as 50 per cent and 90 per cent respectively of the area under these crops. Farmers in Kerala are aware of the benefits of higher productivity of improved seeds, but are unable to take advantage of it owing to inadequate supplies and delay in delivery. According to the Department of Agriculture, the improved strains available with them are suitable to cover about 60 per cent of area under paddy in the State.

2.40 Complete replacement of local seeds by improved seeds would require a large number of strains which can suit all conditions. Evolution of new strains either by breeding or by selection is a long term process requiring facilities and funds. A programme of full coverage is possible only when the number of seed farms to produce and multiply the necessary seeds is large enough. By the end of the Second Plan, the State was expected to have 24 seed farms in addition to a large number of certified growers who were to multiply the nucleus seeds.

2.41. During the next 10 to 15 years the State should aim at complete replacement of local seeds by improved seeds. For a programme of this size, the existing number of seed farms and certified private farms would have to be increased considerably. Due to difficult terrain and scarcity of land, the area of a seed farm in Kerala generally does not exceed 15 acres—of which only one-third may be suitable for wetland cultivation. The number of nucleus seed farms to cover a given area with

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Since this is a matter of all-India policy, the State Government should press the Central Government for an early action on this.

2.100 Tea estate lands are leased to growers by the Government. Most estates hold lands in considerable excess of areas which actually bear tea. Government should compel the lessees to undertake planting tea in all the suitable areas ; failing this, the surplus lands may be taken back from the lessees by the Government.

2.101 A programme of replantation of at least 10,000 acres per year would be necessary during the Third and Fourth Plan periods, specially to compensate for the past neglect. Fresh leases need not be granted for this purpose as there are vast uncropped areas adjacent to tea estates in the areas already leased. Pressure, inducement, incentives in the form of replantation loans and the supply of materials may be employed to achieve the desired results. Estimates of cost of bringing an acre up to the bearing stage vary from Rs. 2,150 to Rs. 3,650 per acre. Adopting the estimate of the Tea Planters Association at Rs. 2,500 per acre, the total investment necessary to raise 10,000 acres of new plantings per year for the next 10 years would be of the order of Rs. 25 crores.

2.102 *Size of the Plantations*: In 1957, there were 282 estates in Kerala. The average size of tea gardens in the State is 350 acres. However, about 50 per cent of the estates were less than 200 acres in area. For economic functioning of a tea estate, it is necessary to have a modern tea processing unit (generally known as a tea factory) attached to the garden. Different estimates show that to be an economic unit, a tea factory needs 822,000 lbs. (about 10,000 maunds) of green leaves a year and to produce this quantity anywhere from 250 to 300 acres of tea acreage would be needed. If this is accepted as a norm, it may be said that about half the tea estates in Kerala are uneconomic. This is indeed a serious problem, since the economic functioning of an estate as well as the quality of tea produced depends on the size and the type of processing machinery employed. An increase in the size of all the plantations with an area below 250 acres is necessary. Long term replantation loans and fresh leases of land, if available, are suggested as measures to correct the existing imbalance.

Rubber

2.103 Kerala holds almost complete monopoly in the sphere of rubber production in the country. Kottayam has the largest concentration of rubber acreage in India. During 1958, Kerala produced 22,159 tons of rubber valued at Rs. 7.69 crores, out of a total all-India production of 25,000 tons. The rubber plantations also employ a large labour force of approximately 80,000 persons.

2.104 Soil, climate and other natural conditions found in Kerala are quite well suited to the growth of rubber plants except that rainfall is not as well distributed over the year as in some other rubber growing areas of the world, such as Malaya and Ceylon. This factor has had a somewhat adverse effect on the yields, which might otherwise have been higher than the present level of 294 lbs. per acre.

2.105 During the last decade there has been a sharp increase in the area under rubber. Between 1951 and 1958 it increased by 90 per cent, that is, from 141,760

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433 249 acres to 270,625 acres. This is a proof of the growing popularity of rubber cultivation in Kerala. Increase has also been registered in the tapped area. During 1951–56, the tapped area increased by about 50 per cent (99,120 to 150,000 acres), though the acreage under rubber increased only by 25 per cent. A higher rate of increase in case of tapped area has been caused by maturing of trees planted before 1951.

433 249 423 2.106 *Distribution of Holdings*: The increase in the number of holdings since 1951 has been much more than the increase in acreage under rubber. There were 50,000 estates in 1958 as against 9,026 in 1951. The increase was roughly 500 per cent as against an increase in the area by about 100 per cent only. The consequence is that today rubber industry in Kerala is marked by the existence of a large number of small-size family estates. The increase in area under small estates is not a healthy trend, as these are uneconomic and have low productivity.

433 249 2.107 *Production and Yields*: During 1958, the total production of rubber in Kerala was 22,200 tons. The production has been steadily rising at a rate of 8.2 per cent per annum which is indeed a very high rate when compared with growth in the gross agricultural production. (Table 13)

[171] 2.108 In 1958 the yield per acre of rubber in Kerala was 294 lbs. which is very low when compared to the yields in Malaya, Ceylon, Indonesia and other rubber growing countries. Compared to 1958, the yield in 1951 was slightly higher standing at 312 lbs. per acre. The decline in yield was partly due to the transfer of Kanyakumari district, which was a high yielding region, to Madras after the reorganization of the States. Partly it was also due to large scale new planting in all the districts except Trichur.

2.109 A significant fact about land productivity is the wide difference in yield rates between big and small estates. In 1958, the average yield of holdings of below 100 acres was only 162 lbs. per acre while in larger holdings it was 486 lbs.

433 249 242 [471] [244] 2.110 Low productivity in smaller gardens is due to the inefficient and unscientific manner in which the estates are managed and lack of resources at the disposal of these estate owners. Scientific and efficient management of rubber gardens requires manuring of gardens, periodic renewal of fences, clearance of under-growth, control of soil erosion, etc. For carrying out these operations, it is necessary to have a large fund of working capital which the small growers do not possess. Small growers, particularly those with 10 acres and less, have very little sustaining power and cannot wait for the trees to attain maturity. Consequently, premature tappings and slaughter tappings are too common among the small estates. The small holders are also tempted to grow an understorey when the plants are young and for that they generally prefer tapioca as it is a food crop with high yields. Under cropping even when properly manured, is not good for the soil but when it is considered along with inadequate manuring, the harm can well be imagined. This type of mismanagement generally does not occur in large plantations. It is high time that something is done to improve the situation. Measures such as amalgamating small units into an economic size and working them on a cooperative basis would perhaps meet the needs. The matter should be further investigated and followed up by suitable action.

2.111 The low yield per acre is also due to the cultivation of low yielding varieties and over-ageing of trees. The Rubber Board reported that at the end of 1955, 80

7 [see p. 278, category 116 -- Analyst]

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per cent of over 200,000 acres planted from 1902 onwards belonged to non-selected and low yielding strains. The Board has also estimated that more than half the rubber area contains trees that have outlived their economic life. Therefore, about 164,000 acres need immediate replantation. The total area planted till 1958 was 45,194 acres and of this replanting accounted for only 7,060 acres. To tone up the yields as well as to keep the trees in a good condition, it is necessary to replant at least 20,000 acres annually. A programme of this magnitude would need an investment of Rs. 50 crores at the rate of Rs. 2,500 per acre.

2.112 In certain well managed estates in Kerala, the yields are reported to be as high as 1,600 lbs. per acre. A large number of estates yield between 700 to 1,000 lbs. This shows the potentialities of raising the yields if the gardens are properly managed. There are also instances of estates, which yielded only 150 lbs. per acre, which have yielded 500 to 600 lbs. per acre after reorganization and improvement of the estates.

2.113 India is the only country in the world which is a producer and at the same time an industrial consumer of natural rubber. The indigenous production of natural rubber in India at present meets about half the needs of the country, the other half being met by imports. The demand for rubber is increasing at a very fast rate and is estimated to be 55,000 tons by 1961, 82,000 tons by 1966 and 125,000 tons by 1971.[1] This means that by 1971 the demand for natural rubber would be about eight times the present level of production. It is, therefore, suggested that utmost possible effort should be put in to step up the production of natural rubber in Kerala.

2.114 Rubber production can be raised by increasing the yields as well as by extending the area under the crop. An increase in the yields is a short term measure which can be realized, say, by the end of the Third Plan, provided the necessary measures are quickly implemented. Adequate annual application of fertilizer mixtures (NPK) coupled with soil conservation measures, working the soil and regulated tapping are some of the important measures that may be adopted. These measures can be undertaken more effectively and economically if the holdings are of larger size. Efforts at intensive cultivation should, therefore, be co-ordinated with increase in the size of small holdings—especially the small ones with less than 15 acres. This could be best achieved through the formation of cooperatives. The Government and the Rubber Board should initiate future development on these lines.

2.115 In addition to replantation, as suggested above, a regular plantation programme is necessary for a sustained increase in output. Raising new plantations to the extent of 300,000 acres may be suggested as the target for the next two Plans. A higher target would be only too desirable. There may, however, be some difficulties in implementing the plantation programme owing to scarcity of land. The exact scope for extension of area under rubber is not known. Various sources put the likely extent of this area to be between 2.25 lakh and 7.5 lakh acres. It is, therefore, suggested that the Department of Agriculture and Forestry should conduct a joint survey to make an accurate estimate of the extent of such land in the State. However, it is necessary to emphasise that the proposed plantations should consist of

[1] NCAER estimates.

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large estates. The small holdings, as explained before, are not economical and have low yields. It is, therefore, necessary to make adequate safeguards against the creation of small units.

2.116 Moreover, care should be taken to see that all future plantings are done with improved clones. This can be much better ensured if departmental planting and working of the estates by Forest Department is undertaken instead of leasing the land under Government ownership to individual growers. It may be assumed that out of 3 lakh acres of proposed plantations, 2 lakh acres would be under Government management and the rest would be planted by private growers. The programme may be phased at the rate of 30,000 acres per year. The total investment for the whole programme would thus be Rs. 75 crores.

2.117 In well-managed estates, the trees begin to yield after seven years. Assuming that the new plantings yield at an average rate of 700 lbs. of rubber per acre, the output of rubber from these would increase progressively from 9,380 tons to 37,520 tons in 1971. Full results from the proposed 3 million acres of new plantings would be visible only from 1978 onwards at the rate of additional 93,800 tons per annum.

Pepper

2.118 The cultivation of pepper in India is almost entirely concentrated in this State which produces over 95 per cent of the country's total output. During 1958 India produced about 27,000 tons of pepper, approximately 45 per cent of the overall world production. Before World War II, Indonesia was the leading producer and exporter of pepper, but since then India has assumed that role. Between 1939 and 1951 production of pepper in the country increased by 16 per cent.

2.119 Large scale cultivation of pepper is confined only to the submountain tracts on or below the Western Ghats. It is also grown in the plains but as a protected garden crop in the compounds of houses and not as a plantation crop. Pepper is a perennial climbing crop and lasts for 20 to 30 years. There are on an average 300 to 400 standards (pepper bushes) per acre. On an average, each standard under plantation conditions yields 1 to 2 lbs.; but it is not uncommon to find standards in house compounds yielding even 40 to 50 lbs.

2.120 As in the case of coconut, it is difficult to arrive at a correct estimate of the area under pepper. The estimate prepared by the Directorate of Statistics in Kerala is of the order of 224,658 acres for 1957-58. Of this, Malabar region accounted for 136,854 acres and the rest were in Travancore-Cochin area. The output of pepper during the same year was 26,020 tons in the whole of Kerala, of which the share of Malabar region was 42 per cent. Malabar with over 60 per cent of the area under pepper produces only 42 per cent of the output.

2.121 Per acre yield was the highest in Alleppey and Quilon (402 lbs. per acre) followed by the districts of Trichur, Ernakulam, Trivandrum and Kottayam (375 to 381 lbs. per acre). Malabar region has comparatively very low yields (180 lbs. per acre). This may, perhaps, be due to cultivation of pepper in Malabar on extensive rather than on intensive lines.

4.48 Compared to the eucalyptus plantations, the area over which wattle can grow is rather limited. This tree can only grow in the high ranges at elevations above 4,000 feet. The Hamilton Plateau in the Devicolom range is a suitable locality and there is a proposal to afforest, 5,200 acres during the Third Plan. The cost of afforestation is between Rs. 120 to Rs. 150 per acre. This plantation would supply the raw material for wattle bark extract industry. There does not appear to be much scope for extension of area under this species after the Third Plan period.

4.49 As these plantations are to be raised in the high ranges, it will be desirable to establish regular labour colonies and employ labour on a more or less permanent basis. Some agricultural occupation will also have to be provided to the labour force. It is, therefore, proposed that the establishment of regular forest villages in the grasslands should be seriously considered by the Government. They will also provide the much needed labour for raising and upkeep of the plantations and later for manning the newsprint mills which will be established at the end of 10 years. The exact employment potential is difficult to work out but it is estimated that the plantations will be able to support about 500 families, each family providing two able-bodied workers.

4.50 Cashewnut trees can be raised in the barren forest areas which are considered unsuitable for any other type of forest growth. In Trichur and Malayathur divisions, where these plantations are located, there are further tracts of barren unproductive reserves. Attempts at raising useful forest species having failed, these areas may be put under cashewnut plantations. If Malabar forests are acquired promptly, another 5,000 acres could be planted with cashewnuts during the next decade.

4.51 The technique of cashewnut afforestation is still in an experimental stage, but the highest success obtained so far has been with dribbling seed to a depth of 3 inches at a spacing of 30 ft. × 30 ft. which gives 49 plants per acre. Plantations raised at a spacing of 18 ft. × 18 ft. (125 trees per acre) have also given good results. Experiments on spacing should continue and the optimum spacing in different types of soil may be determined. The cost has been worked out at Rs. 35 per acre plus another Rs. 5 per acre as establishment charges.

Rubber Plantations

4.52 Rubber is one of the chief plantation crops of Kerala. The present area under rubber is roughly 2·5 lakh acres. Since rubber plantations provide a valuable raw material and a good source of employment in the primary sector, it is proposed to raise rubber plantations over a fairly large area of secondary forests. So far as protective functions of a forest area is concerned, this would be a change for the better, as areas under rubber are better protected than a forest and trespasses are not allowed. Other aspects of the problem are discussed in the Chapter 2 on Agriculture and Plantations.

4.53 The targets for additional acreage to be brought under different type of plantations, discussed above and the figures for investment required are summarized

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TABLE 12

AREA IRRIGATED ACCORDING TO SOURCES

(In '000 acres)

Source	*1960-61*	*Per cent to total*	*1966-67*	*Per cent to total*	*Per cent (+)/(—) (3) / (1)*
1	2	3	4	5	6
Government Canals	321	43.15	343	41.38	+ 6.8
Private Canals	68	9.14	71	8.57	+ 4.4
Total Canals	*389*	*52.29*	*414*	*49.96*	+ 6.4
Tanks	82	11.03	77	9.28	— 6.1
Wells	26	3.49	29	3.49	+11.5
Other sources	247	33.19	309	37.28	+25.1
TOTAL	*744*	*100.00*	*829*	*100.00*	*+11.4*

TABLE 13

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AREA AND PRODUCTION OF RUBBER IN KERALA

Year	*No. of estates on 31st December*	*Area abandoned during the year* (In acres)	*New extension during the year including re-planting included in areas abandoned in the previous year*	*Total area under rubber during the year* (In acres)	*Area that has been tapped during the year* (In acres)	*Quantity of dry rubber produced* (Tons)
1951	9,026	1,856	4,386	141,759	99,078	13,800
1952	9,186	2,130	3,819	143,448	105,762	15,568
1953	14,231	1,489	1,555	163,254	143,263	19,430
1954	14,336	460	1,769	165,834	17,711	18,768
1955	14,386	2,386	4,963	168,412	152,831	21,605
1956	18,082	4,381	13,785	177,826	150,005	21,079
1957	43,783	4,230	31,699	246,793	167,421	21,496
1958	5,005	2,726	26,558	270,625	169,492	22,159